

Dr. Youwei Yao

Dr. Youwei Yao is a post-doctoral associate working in the Space Nanotechnology Laboratory, MIT Kavli Institute for Astrophysics and Space Research. His research interest is in precision surface technology for x-ray telescope mirrors. During the previous eight years before MIT, he did research in the Ux lab in Nagoya University for the Hitomi Observatory, and then in Prof. Mel Ulmer's lab in Northwestern University. He came to the MIT to work on technology for the Lynx telescope mission concept. His research focus ranges from multilayer optics coatings for x-ray reflection (supermirror design and fabrication) to stressed coatings for sub-arc-sec mirror figure correction. In the MIT lab, he invented and developed a novel thermal oxide patterning method for high precision x-ray mirror figure correction. He led the MIT team to successfully demonstrate, for the first time, correction of x-ray telescope mirrors for distortion caused by mirror coatings.

He has published, or submitted for publication original research contributions in 23 papers, including nine to refereed journals. He has served as a member of Lynx Optics Working Group, an NASA advisory body on x-ray telescope mirror technology. He has also served as a reviewer for several technical journals.

Academic background

- Sep. 2003 - June 2007 B.S. in Physics, Tongji University, Shanghai, China.
- Sep. 2007 - June 2010 M.S. in Optics, Tongji University, Shanghai, China.
- Sep. 2010 - Sep. 2013 Ph.D. in Physics, Nagoya University, Nagoya, Japan.
- Dissertation: *Theoretical analysis, design and fabrication of supermirrors for hard x-ray telescopes.* (adv. Hideyo Kunieda).

Professional positions and appointments

- Mar. 2016 - present Post-Doctoral Associate, Kavli Institute for Astrophysics and Space Research, MIT
- Mar. 2014 - Mar. 2016 Postdoctoral Associate, Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA), Northwestern University

Patents

- Yao, Y.W., Wang, X., Ulmer, M. and Cao, J. "Stress manipulated coating for figure reshape of light weight optics mirrors," US Patent No. 9,864,105 B2, Jan. 9, 2018.

Selected publications

- Y. Yao, H. Kunieda, H. Matsumoto, K. Tamura, and Y. Miyata, "Design and fabrication of a supermirror with smooth and broad response for hard X-ray telescopes," *Appl. Opt.*, **52**(27), 8624-33 (2013).
- Y. Yao, X. Wang, J. Cao, and M. Ulmer, "Stress manipulated coating for fabricating light weight X-ray telescope mirrors," *Opt. Express*, **23**(22), 28605-18 (2015).
- Y. Yao, B. Chalifoux, R. Heilmann, and M. Schattenburg, "Thermal oxide patterning method for compensating coating stress in silicon substrates," *Opt. Express*, **27**(2), 1010-1024 (2019).
- Y. Yao and H. Kunieda, "Suppression of reflected side lobes in narrow-band X-ray multilayer coatings," *Opt. Express*, **27**(5), 7537-7544 (2019).
- Y. Yao, B. Chalifoux, R. Heilmann, K. Chan, H. Mori, T. Okajima, W. Zhang, and M. Schattenburg, "Progress of coating stress compensation of silicon mirrors for the Lynx X-ray telescope mission concept using a thermal oxide patterning method," *JATIS*, **5**(2), 021011 (2019).